

Mind the Gap: Neuroscience Literacy and the Next Generation of Psychiatrists

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Abstract The National Institute of Mental Health seeks to address the gap between modern neuroscience and psychiatric training. The authors describe a two-pronged approach: first, to identify and support trainees in clinical neuroscience and second, to promote neuroscience literacy in psychiatric residency programs.

Keywords Psychiatric residency training · Milestones · Next Accreditation System · Neuroscience education · Curriculum development

It has been said that psychiatry and neurology are two specialties separated by a common organ. Even more vexing is the separation of psychiatry from modern neuroscience, especially because neuroscience has transformed our understanding and approaches to that organ, the brain [1]. Despite the revolution in brain research of the past few decades, psychiatry continues to train its newest practitioners according to an outdated model of how the brain works or, in many cases, just ignores it. Fewer than half of US psychiatry residency programs provide any education in modern systems neuroscience [2, 3]. This educational pattern may be a byproduct of the written requirements for psychiatry residency programs as outlined by the Psychiatry Residency Review Committee (RRC), which does not include the term *neuroscience*. The word *brain* occurs only once, in the term “traumatic brain injury” [4].

This gap between modern neuroscience and psychiatry training seems especially unfortunate given the different trajectories of these fields. Whereas the recruitment to psychiatry has decreased over the past two decades, interest in neuroscience has expanded rapidly, as evidenced by the growth in the number of members of the Society for Neuroscience (now exceeding 40,000) and the popularity of neuroscience as an undergraduate major and graduate program. Today’s students appear to be even more interested in “brain and behavior,” “the biology

of emotion,” and “the unconscious” than previous generations, but many of these students have been choosing neuroscience, not psychiatry, as the field to pursue these topics.

Over the past decade, however, we have seen an emerging trend: a new generation of MD-PhDs, many of them trained in neuroscience, who are entering psychiatry. According to AAMC data, the numbers of MD-PhDs matching in psychiatry increased from 14 in 2000 to 32 in 2010. This trend notwithstanding, psychiatry continues to face a workforce shortage. We see this shortage in two general areas. More psychiatrists are required to address the unmet treatment needs of the public [5], and we need a next generation of scientific leaders who will transform our diagnostics and therapeutics using neuroscience tools to address these needs. Given these twin goals, the National Institute of Mental Health (NIMH) is taking a two-pronged approach that includes next-generation efforts to identify and support trainees who will redefine psychiatry as “clinical neuroscience,” and neuroscience literacy efforts that encourage the integration of neuroscience into the training of psychiatry residents.

Next Generation of Clinical Neuroscientists

NIMH has made both longstanding and more recent efforts to provide a series of stepping stones that promote and support scientific research careers among psychiatry trainees [6]. A few examples are described below.

The Outstanding Resident Award Program (ORAP) is an annual solicitation that invites US psychiatry residency programs to nominate one PGY2 resident with great academic potential. The award has existed for over 25 years, and only 10 to 12 residents are recognized each year. Increasingly, the nominees have backgrounds in neuroscience. Many ORAP residents have pursued stellar research careers and become leaders in academic psychiatry.

NIMH Brain Camp, a program in its sixth year, is an intensive scientific retreat that brings together research-oriented residents and fellows, NIMH leadership, and

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outstanding clinical neuroscience faculty from around the country for lectures and discussion. Most of the sessions have been held at the Banbury Conference Center associated with Cold Spring Harbor Laboratories and have included both formal and informal interactions with Nobel laureates and other senior investigators. Trainees are also given a forum in which to discuss barriers to pursuing a research career.

NIMH has supported an intramural clinical fellowship program since 1954. At its inception, the program was the primary site for training psychiatrist-researchers in the USA. Although much research training has now been dispersed across academic medical centers, the NIMH program continues to serve as a national resource for clinical neuroscience research training starting either in the PGY4 year or post-residency.

R25 grants are competitive grants that facilitate research training during psychiatry residency by partially defraying salary costs for research track residents in order for them to conduct mentored research. In 2012, NIMH supported six programs with 47 total trainees involved in a range of basic and clinical research, including one program specifically focused on child psychiatry research. The outcome data from these programs will help evaluate the success of this initiative.

These stepping stones are only helpful if there are steps in place beyond the end of training. NIMH supports early-stage investigators in several ways. The K award mechanism continues to have a success rate in excess of 35 %. In 2012, NIMH supported over 300 mentored K awards. The BRAINS (Biobehavioral Research Awards for Innovative New Scientists) program provides 5 years of support for early-stage investigators with innovative ideas, of whom about one third are MDs or MD-PhDs. NIMH also maintains a different pay line for early-stage investigators applying for RO1 grants, ensuring a success rate that is equivalent to that of experienced investigators.

Enhancing Neuroscience Literacy

The second prong is to promote neuroscience literacy for all psychiatrists, but particularly those in training. This is a broader goal that will need to involve many stakeholders, including educators and institutions that oversee psychiatry training, such as the Accreditation Council for Graduate Medical Education (ACGME), the RRC for Psychiatry, and the American Association of Directors of Psychiatry Residency Training (AADPRT). A paper published by Reynolds and colleagues [7] described a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of the future direction of psychiatry and concluded that its future lies with the grounding of psychiatry as a clinical neuroscience.

Yet the question could be asked, why does a psychiatrist need to know about synaptic plasticity or neurodevelopment? How can room be made within an already crowded residency curriculum for more content?

One example of how NIMH has contributed to neuroscience literacy is a pair of online Neuroscience and Psychiatry teaching modules that introduce trainees to neuroscience research that underlies the basis for novel therapeutics. The modules include a compelling science story that links a clinical case to neuroscience concepts and provides important insights to the formulation and treatment of the clinical problem [9, 10]. We anticipate that psychiatrists will increasingly need to integrate knowledge of neuroscience with clinical expertise to use novel therapeutic approaches and new technologies to treat psychiatric conditions.

Another approach to teaching genetic, cellular, and systems neuroscience concepts to trainees is to follow the example of the Research Domain Criteria (RDoC) project launched by NIMH. Although RDoC is being developed primarily for research purposes, it provides an alternative framework for organizing mental illnesses on the basis of clinically relevant neurobiological dimensions. Because RDoC is agnostic when it comes to DSM diagnostic categories, it can be used to teach about brain dysfunction across traditional diagnoses, for instance, at the level of brain circuits. An innovative neuroscience course for psychiatry residents using RDoC is described by Etkin and Cuthbert [11].

The fundamental argument underlying the case for neuroscience literacy, however, is not just that a deeper understanding of neural circuits and biomarkers will be essential for the psychiatry of the future but that the public and patients have expectations. Our patients, who increasingly understand mental disorders as brain disorders, will expect that psychiatrists know and can educate them about neuroscience breakthroughs described in the media. Public demand and expectations are high. Witness the growth in advocacy organizations that fund research on brain disorders such as the Brain and Behavior Research Foundation (formerly NARSAD) or Autism Speaks. If we follow the public's lead, it makes sense to teach clinicians how to understand and critically evaluate the science as it develops. Along those lines, the residency program at Yale includes a 6-week course during the PGY4 year titled "*NY Times Psychiatry*," which teaches critical appraisal of contemporary media coverage of psychiatry and neuroscience [8].

Impact of Regulatory Changes

Although the call to embrace neuroscience by psychiatry has been made for at least a decade, sometimes the best way to achieve change is simply to change the rules. An ambitious revision by the ACGME in its Next Accreditation System (NAS) requires the use of milestones to track residency competencies [12]. Milestones are defined as observable developmental steps in the six competency areas specific to each medical specialty (patient care, medical knowledge,

professionalism, interpersonal and communication skills, systems-based practice, and practice-based learning and improvement). Residents will be rated on each milestone area using a 5-point anchored scale (from novice to expert). For psychiatry, this means a much more detailed set of specified areas of education and training, which will be instituted in July 2014. Of note, the milestones for psychiatry, include one on clinical neuroscience as well as one on critical evaluation of research and clinical evidence. Thus, psychiatry residency programs will be required to attest to the competency of its residents in these areas along with those areas having to do with clinical assessment and therapeutics. It is now likely that the NAS milestones will provide an opportunity for psychiatry programs to create new educational content and expectations for its trainees that can enrich their neuroscience literacy and improve the connections between neuroscience and psychiatry programs in a global and meaningful way.

Implications for Educators

- Identify and encourage medical students and residents with an interest in clinical neuroscience
 - Be aware of special awards and programs for research-oriented residents
 - Revise residency programs using the New Accreditation System Milestones to integrate up-to-date neuroscience content
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Implications for Academic Leaders

- Envision psychiatry as a brain-centered discipline
 - Recruit and hire academic psychiatrists with expertise in clinical neuroscience as future leaders of the field
 - Enhance the neuroscience literacy of all psychiatrists through educational and training programs
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